Attachment A

Large Woody Debris Data Summary Forms

Large Woody Debris Data Summary Form

Date: **10/8/2015**
Enbridge Representative(s): **BP, BD, IJ**
Target Area: **17**
Agency Representative(s): **MD, BG SJ, JR**
Mile Post Range: **35.12-36.30**

Existing Large Woody Debris Observations

General Number of LWD Observed: **109**
LWD Type (tree, log, stump complex pile)(%): **CP-52%, Log-17%, Tree- 24%, Stump 7%**
Position Orientation (parallel, perpendicular, diagonal to flow)(%): **Para-48%**
Diagnoal- 14%, Perp.-38%
Habitat/Structure Function: **All provides fish and amphibian/reptile habitat,**
Notes: **most do not have pools, one providing bank protection, none marked as causing bank erosion**

River Characterisitics

Channel Width: 251 ft
Pool Depths: **3.5'-5'**
Bed Material Composition: Sand/Fine Gravels
Riffle Depths: **2'-2.5'**
Rosgen (BEHI) Bank Stability: See Note 1
Flow Velocity: **1.2 fps**
Notes:

Proposed Design Concepts

Type(s) of LWD:
Number of LWD:
Proposed Habitat/Structure Function (s):

See notes on target area survey field maps.

Other Items/Notes:

1. Generalized erosion mapping provied on annotated field maps, with
Erosion Rated as follows: A: BEHI Low to Moderate B: BEHI Moderate to High,
C: BEHI High to Very High
2. General observations: mostly fine gravels with sand, imbricated rigid bottom

Large Woody Debris Data Summary Form

Date: **10/9/2015**
Enbridge Representative(s): **BP, BD, IJ**
Target Area: **16**
Agency Representative(s): **MD, BG SJ, JR**
Mile Post Range: **34.25-34.75**

Existing Large Woody Debris Observations

General Number of LWD Observed: **64**
LWD Type (tree, log, stump complex pile)(%): **CP-53%, Log-20%, Tree- 20%, Stump 7%**
Position Orientation (parallel, perpendicular, diagonal to flow)(%): **Para-48%**
Diagonal- 19%, Perp.-39%
Habitat/Structure Function: **All provides fish and amphibian/reptile habitat,**
Notes: **most do not have pools, none providing bank protection, none marked as causing bank erosion**

River Characterisitics

Channel Width: 160 ft
Pool Depths: **4'-5' (Pool/Run)**
Bed Material Composition: Cobble/Gravel
Riffle Depths: **2'-2.5'**
Rosgen (BEHI) Bank Stability: See Note 1
Flow Velocity: **1.7 fps**
Notes:

Proposed Design Concepts

Type(s) of LWD:
Number of LWD:
Proposed Habitat/Structure Function (s):

See notes on target area survey field maps.

Other Items/Notes:

1. Generalized erosion mapping provied on annotated field maps, with
Erosion Rated as follows: A: BEHI Low to Moderate B: BEHI Moderate to High,
C: BEHI High to Very High
2. General observations: narrow runs

Large Woody Debris Data Summary Form

Date: **10/9/2015**
Enbridge Representative(s): **BP, BD, IJ**
Target Area: **15**
Agency Representative(s): **MD, BG SJ, JR**
Mile Post Range: **33.10-34.00**

Existing Large Woody Debris Observations

General Number of LWD Observed: **78**
LWD Type (tree, log, stump complex pile)(%): **CP-42%, Log-22%, Tree- 21%, Stump 15%**
Position Orientation (parallel, perpendicular, diagonal to flow)(%): **Para-36%**
Diagnoal- 7%, Perp.-57%
Habitat/Structure Function: **All provides fish and amphibian/reptile habitat,**
Notes: **most do not have pools, none providing bank protection, none marked as causing bank erosion**

River Characterisitics

Channel Width: 228 ft
Pool Depths: **5'-8'**
Bed Material Composition: Sand
Riffle Depths: **No discernable riffl**
Rosgen (BEHI) Bank Stability: See Note 1
Flow Velocity: **1 fps**
Notes:

Proposed Design Concepts

Type(s) of LWD:
Number of LWD:
Proposed Habitat/Structure Function (s):

See notes on target area survey field maps.

Other Items/Notes:

1. Generalized erosion mapping provied on annotated field maps, with
Erosion Rated as follows: A: BEHI Low to Moderate B: BEHI Moderate to High,
C: BEHI High to Very High
2. General observations: mostly overly wide throughout reach, predominately stable

Large Woody Debris Data Summary Form

Date: **10/8/2015**

Enbridge Representative(s): **BP, BD, IJ**

Target Area: **12**

Agency Representative(s): **MD, BG SJ, JR**

Mile Post Range: **29.70-30.50**

Existing Large Woody Debris Observations

General Number of LWD Observed: **58**

LWD Type (tree, log, stump complex pile)(%): **CP-47%, Log-21%, Tree- 21%, Stump 12%**

Position Orientation (parallel, perpendicular, diagonal to flow)(%): **Para-36%**

Diagnoal- 7%, Perp.-57%

Habitat/Structure Function: **All provides fish and amphibian/reptile habitat,**

Notes: **most do not have pools, none providing bank protection, none marked as causing bank erosion**

River Characterisitics

Channel Width: 148 ft

Pool Depths: **5'-8'**

Bed Material Composition: Cobble/Gravel

Riffle Depths: **No discernable riffl**

Rosgen (BEHI) Bank Stability: See Note 1

Flow Velocity: **1 fps**

Notes:

Proposed Design Concepts

Type(s) of LWD:

Number of LWD:

Proposed Habitat/Structure Function (s):

See notes on target area survey field maps.

Other Items/Notes:

1. Generalized erosion mapping provied on annotated field maps, with Erosion Rated as follows: A: BEHI Low to Moderate B: BEHI Moderate to High, C: BEHI High to Very High

Large Woody Debris Data Summary Form

Date: **10/8/2015**

Enbridge Representative(s): **BP, BD, IJ**

Target Area: **10**

Agency Representative(s): **MD, BG SJ, JR**

Mile Post Range: **25.625-27.625**

Existing Large Woody Debris Observations

General Number of LWD Observed: **220**

LWD Type (tree, log, stump complex pile)(%): **CP-51%, Log-20%, Tree- 26%, Stump 3%**

Position Orientation (parallel, perpendicular, diagonal to flow)(%): **Para-29%**

Diagnoal- 14%, Perp.-57%

Habitat/Structure Function: **All provides fish and amphibian/reptile habitat,**

Notes: **most do not have pools, none providing bank protection, none marked as causing bank erosion**

River Characterisitics

Channel Width: 176 ft

Pool Depths: **5.5'-9'**

Bed Material Composition: Cobble/Gravel

Riffle Depths: **1'-1.5'**

Rosgen (BEHI) Bank Stability: See Note 1

Flow Velocity: **1.5 fps**

Notes:

Proposed Design Concepts

Type(s) of LWD:

Number of LWD:

Proposed Habitat/Structure Function (s):

See notes on target area survey field maps.

Other Items/Notes:

1. Generalized erosion mapping provied on annotated field maps, with Erosion Rated as follows: A: BEHI Low to Moderate B: BEHI Moderate to High, C: BEHI High to Very High
2. General observations: highly sinuous, lower width/depth

Large Woody Debris Data Summary Form

Date: **10/7/2015**
Enbridge Representative(s): **BP, BD, IJ**
Target Area: **1**
Agency Representative(s): **MD, JW SJ, JR**
Mile Post Range: **5.75-6.75**

Existing Large Woody Debris Observations

General Number of LWD Observed: **63**
LWD Type (tree, log, stump complex pile)(%): **CP-49%, Log-30%, Tree- 19%, Stump 2%**
Position Orientation (parallel, perpendicular, diagonal to flow)(%): **Para-38%**
Diagnoal- 23%, Perp.-38%
Habitat/Structure Function: **Most provides fish and amphibian/reptile habitat,**
Notes: **most do not have pools, some providing bank protection, five marked as causing bank erosion**

River Characterisitics

Channel Width: 180 ft
Pool Depths: **2'**
Bed Material Composition: Cobble/Gravel
Riffle Depths: **1'**
Rosgen (BEHI) Bank Stability: See Note 1
Flow Velocity: **1.5 fps**
Notes:

Proposed Design Concepts

Type(s) of LWD:
Number of LWD:
Proposed Habitat/Structure Function (s):

See notes on target area survey field maps.

Other Items/Notes:

1. Generalized erosion mapping provied on annotated field maps, with
Erosion Rated as follows: A: BEHI Low to Moderate B: BEHI Moderate to High,
C: BEHI High to Very High
2. General observations: pools relatively shallow, reach overly wide

Large Woody Debris Data Summary Form

Date: **10/8/2015**
Enbridge Representative(s): **BP, BD, IJ**
Target Area: **8**
Agency Representative(s): **MD, BG SJ, JR**
Mile Post Range: **21.25-22.75**

Existing Large Woody Debris Observations

General Number of LWD Observed: **200**
LWD Type (tree, log, stump complex pile)(%): **CP-56%, Log-23%, Tree- 20%, Stump 1%**
Position Orientation (parallel, perpendicular, diagonal to flow)(%): **Para-25%**
Diagnoal- 33%, Perp.-41%
Habitat/Structure Function: **All provides fish and amphibian/reptile habitat,**
Notes: **most do not have pools, few providing bank protection, two marked as causing bank erosion**

River Characterisitics

Channel Width: 172 ft
Pool Depths: **4.5'-7'**
Bed Material Composition: Cobble/Gravel
Riffle Depths: **1.5'-2'**
Rosgen (BEHI) Bank Stability: See Note 1
Flow Velocity: **1.9 fps**
Notes:

Proposed Design Concepts

Type(s) of LWD:
Number of LWD:
Proposed Habitat/Structure Function (s):

See notes on target area survey field maps.

Other Items/Notes:

1. Generalized erosion mapping provied on annotated field maps, with
Erosion Rated as follows: A: BEHI Low to Moderate B: BEHI Moderate to High,
C: BEHI High to Very High
2. General observations: lower width/depth, deeper pools, runs and some riffles

Large Woody Debris Data Summary Form

Date: **10/8/2015**
Enbridge Representative(s): **BP, BD, IJ**
Target Area: **7**
Agency Representative(s): **MD, BG SJ, JR**
Mile Post Range: **19.25-20.25**

Existing Large Woody Debris Observations

General Number of LWD Observed: **117**
LWD Type (tree, log, stump complex pile)(%): **CP-56%, Log-32%, Tree- 11%, Stump 1%**
Position Orientation (parallel, perpendicular, diagonal to flow)(%): **Para-48%**
Diagnoal- 21%, Perp.-32%
Habitat/Structure Function: **Almost all provides fish and amphibian/reptile habitat,**
Notes: **most do not have pools, some providing bank protection, none marked as causing bank erosion**

River Characterisitics

Channel Width: 248 ft
Pool Depths: **2.6' (Plane bed)**
Bed Material Composition: Coars sands/Gravels
Riffle Depths: **2.6'**
Rosgen (BEHI) Bank Stability: See Note 1
Flow Velocity: **0.6 fps**
Notes:

Proposed Design Concepts

Type(s) of LWD:
Number of LWD:
Proposed Habitat/Structure Function (s):

See notes on target area survey field maps.

Other Items/Notes:

1. Generalized erosion mapping provied on annotated field maps, with Erosion Rated as follows: A: BEHI Low to Moderate B: BEHI Moderate to High, C: BEHI High to Very High

Large Woody Debris Data Summary Form

Date: **10/8/2015**

Enbridge Representative(s): **BP, BD, IJ**

Target Area: **9**

Agency Representative(s): **MD, BG SJ, JR**

Mile Post Range: **24.375**

Existing Large Woody Debris Observations

General Number of LWD Observed: **53**

LWD Type (tree, log, stump complex pile)(%): **CP-60%, Log-21%, Tree- 19%, Stump 0%**

Position Orientation (parallel, perpendicular, diagonal to flow)(%): **Para-34%**

Diagnoal- 11%, Perp.-55%

Habitat/Structure Function: **All provides fish and amphibian/reptile habitat,**

Notes: **most do not have pools, none providing bank protection, none marked as causing bank erosion**

River Characterisitics

Channel Width: 165 ft

Pool Depths: **4'-6'**

Bed Material Composition: Cobble/Gravel

Riffle Depths: **1.25'-2'**

Rosgen (BEHI) Bank Stability: See Note 1

Flow Velocity: **1.7 fps**

Notes:

Proposed Design Concepts

Type(s) of LWD:

Number of LWD:

Proposed Habitat/Structure Function (s):

See notes on target area survey field maps.

Other Items/Notes:

1. Generalized erosion mapping provied on annotated field maps, with Erosion Rated as follows: A: BEHI Low to Moderate B: BEHI Moderate to High, C: BEHI High to Very High
2. General observations: deeper pools mostly stable, cobbly

Large Woody Debris Data Summary Form

Date: **10/8/2015**
Enbridge Representative(s): **BP, BD, IJ**
Target Area: **11**
Agency Representative(s): **MD, BG SJ, JR**
Mile Post Range: **28.00-29.25**

Existing Large Woody Debris Observations

General Number of LWD Observed: **107**
LWD Type (tree, log, stump complex pile)(%): **CP-38%, Log-36%, Tree- 22%, Stump 4%**
Position Orientation (parallel, perpendicular, diagonal to flow)(%): **Para-50%**
Diagnoal- 9%, Perp.-42%
Habitat/Structure Function: **All provides fish and amphibian/reptile habitat,**
Notes: **most do not have pools, none providing bank protection, one marked as causing bank erosion**

River Characterisitics

Channel Width: 190 ft
Pool Depths: **4.5'-7'**
Bed Material Composition: Coars Sands/Gravel
Riffle Depths: **2'-3'**
Rosgen (BEHI) Bank Stability: See Note 1
Flow Velocity: **1.7 fps**
Notes:

Proposed Design Concepts

Type(s) of LWD:
Number of LWD:
Proposed Habitat/Structure Function (s):

See notes on target area survey field maps.

Other Items/Notes:

1. Generalized erosion mapping provied on annotated field maps, with Erosion Rated as follows: A: BEHI Low to Moderate B: BEHI Moderate to High, C: BEHI High to Very High

Large Woody Debris Data Summary Form

Date: **10/8/2015**
Enbridge Representative(s): **BP, BD, IJ**
Target Area: **14**
Agency Representative(s): **MD, BG SJ, JR**
Mile Post Range: **32.25-32.75**

Existing Large Woody Debris Observations

General Number of LWD Observed: **57**
LWD Type (tree, log, stump complex pile)(%): **CP-44%, Log-30%, Tree- 25%, Stump 2%**
Position Orientation (parallel, perpendicular, diagonal to flow)(%): **Para-48%**
Diagnoal- 17%, Perp.-35%
Habitat/Structure Function: **All provides fish and amphibian/reptile habitat,**
Notes: **most do not have pools, none providing bank protection, none marked as causing bank erosion**

River Characterisitics

Channel Width: 188 ft
Pool Depths: **3.5'-5'**
Bed Material Composition: Cobble/Gravel
Riffle Depths: **No discernable riffl**
Rosgen (BEHI) Bank Stability: See Note 1
Flow Velocity: **1.5 fps**
Notes:

Proposed Design Concepts

Type(s) of LWD:
Number of LWD:
Proposed Habitat/Structure Function (s):

See notes on target area survey field maps.

Other Items/Notes:

1. Generalized erosion mapping provied on annotated field maps, with
Erosion Rated as follows: A: BEHI Low to Moderate B: BEHI Moderate to High,
C: BEHI High to Very High
2. General observations: pools relatively shallow, reach overly wide

Large Woody Debris Data Summary Form

Date: **10/7/2015**
Enbridge Representative(s): **BP, BD, IJ**
Target Area: **6**
Agency Representative(s): **MD, JW, SJ, JR**
Mile Post Range: **14.75**

Existing Large Woody Debris Observations

General Number of LWD Observed: **9**
LWD Type (tree, log, stump complex pile)(%): **CP-22%, Log-11%, Tree- 67%, Stump 0%**
Position Orientation (parallel, perpendicular, diagonal to flow)(%): **Para-20%**
Diagnoal- 20%, Perp.-60%
Habitat/Structure Function: **All provides fish and amphibian/reptile habitat,**
Notes: **most do not have pools, few providing bank protection, none marked as causing bank erosion**

River Characterisitics

Channel Width: 229 ft
Pool Depths: **4'**
Bed Material Composition: Coarse sands/gravels
Riffle Depths: **No discernible riffle**
Rosgen (BEHI) Bank Stability: See Note 1
Flow Velocity: **NA/**
Notes:

Proposed Design Concepts

Type(s) of LWD:
Number of LWD:
Proposed Habitat/Structure Function (s):

See notes on target area survey field maps.

Other Items/Notes:

1. Generalized erosion mapping provied on annotated field maps, with Erosion Rated as follows: A: BEHI Low to Moderate B: BEHI Moderate to High, C: BEHI High to Very High

Large Woody Debris Data Summary Form

Date: **10/7/2015**
Enbridge Representative(s): **BP, BD, IJ**
Target Area: **3**
Agency Representative(s): **MD, JW, SJ, JR**
Mile Post Range: **10.50-11.00**

Existing Large Woody Debris Observations

General Number of LWD Observed: **48**
LWD Type (tree, log, stump complex pile)(%): **CP-16%, Log-23%, Tree-15%, Stump 2%**
Position Orientation (parallel, perpendicular, diagonal to flow)(%): **Para-38%**
Diagnoal- 23%, Perp.-40%
Habitat/Structure Function: **All provides fish and amphibian/reptile habitat,**
Notes: **most do not have pools, most providing bank protection, one marked as causing bank erosion**

River Characterisitics

Channel Width: 161 ft
Pool Depths: **4.5'**
Bed Material Composition: Coarse Sand/Gravel
Riffle Depths: **2'**
Rosgen (BEHI) Bank Stability: See Note 1
Flow Velocity: **0.8 fps**
Notes:

Proposed Design Concepts

Type(s) of LWD:
Number of LWD:
Proposed Habitat/Structure Function (s):

See notes on target area survey field maps.

Other Items/Notes:

1. Generalized erosion mapping provied on annotated field maps, with
Erosion Rated as follows: A: BEHI Low to Moderate B: BEHI Moderate to High,
C: BEHI High to Very High
2. General observations: more pools, deeper runs, sandier substrate,

Large Woody Debris Data Summary Form

Date: **10/7/2015**
Enbridge Representative(s): **BP, BD, IJ**
Target Area: **2**
Agency Representative(s): **MD, JW, SJ, JR**
Mile Post Range: **7.375-8.25**

Existing Large Woody Debris Observations

General Number of LWD Observed: **73**
LWD Type (tree, log, stump complex pile)(%): **CP-37%, Log-41%, Tree-19%, Stump 3%**
Position Orientation (parallel, perpendicular, diagonal to flow)(%): **Para-47%**
Diagnoal- 27%, Perp.-26%
Habitat/Structure Function: **Almost all provides fish and amphibian/reptile habitat,**
Notes: **most do not have pools, most providing bank protection, none marked as causing bank erosion**

River Characterisitics

Channel Width: 158 ft
Pool Depths: **4.5'**
Bed Material Composition: Cobble/Gravel
Riffle Depths: **2'**
Rosgen (BEHI) Bank Stability: See Note 1
Flow Velocity: **0.8 fps**
Notes:

Proposed Design Concepts

Type(s) of LWD:
Number of LWD:
Proposed Habitat/Structure Function (s):

See notes on target area survey field maps.

Other Items/Notes:

1. Generalized erosion mapping provied on annotated field maps, with
Erosion Rated as follows: A: BEHI Low to Moderate B: BEHI Moderate to High,
C: BEHI High to Very High
2. General observations: pools relatively shallow, reach overly wide

Large Woody Debris Data Summary Form

Date: **10/7/2015**
Enbridge Representative(s): **BP, BD, IJ**
Target Area: **4**
Agency Representative(s): **MD, JW, SJ, JR**
Mile Post Range: **11.75**

Existing Large Woody Debris Observations

General Number of LWD Observed: **15**
LWD Type (tree, log, stump complex pile)(%): **CP-33% Log-20%, Tree-33%, Stump 13%**
Position Orientation (parallel, perpendicular, diagonal to flow)(%): **Para-11%**
Diagnoal- 10%, Perp.-79%
Habitat/Structure Function: **All provides fish and amphibian/reptile habitat,**
Notes: **most do not have pools, none providing bank protection, none marked as causing bank erosion**

River Characterisitics

Channel Width: 140 ft
Pool Depths: **4.5'**
Bed Material Composition: Cobble/Gravel
Riffle Depths: **1.8'**
Rosgen (BEHI) Bank Stability: See Note 1
Flow Velocity: **1.9 fps**
Notes:

Proposed Design Concepts

Type(s) of LWD:
Number of LWD:
Proposed Habitat/Structure Function (s):

See notes on target area survey field maps.

Other Items/Notes:

1. Generalized erosion mapping provied on annotated field maps, with
Erosion Rated as follows: A: BEHI Low to Moderate B: BEHI Moderate to High,
C: BEHI High to Very High
2. General observations: deeper pools, lower width/depth for a lot of reach

Large Woody Debris Data Summary Form

Date: **10/7/2015**
Enbridge Representative(s): **BP, BD, IJ**
Target Area: **5**
Agency Representative(s): **MD, JW, SJ, JR**
Mile Post Range: **12.5**

Existing Large Woody Debris Observations

General Number of LWD Observed: **26**
LWD Type (tree, log, stump complex pile)(%): **CP-46% Log-19%, Tree-35%, Stump 0%**
Position Orientation (parallel, perpendicular, diagonal to flow)(%): **Para-33%**
Diagnoal- 13%, Perp.-54%
Habitat/Structure Function: **All provides fish and amphibian/reptile habitat,**
Notes: **most do not have pools, few providing bank protection, none marked as causing bank erosion**

River Characterisitics

Channel Width: 118 ft
Pool Depths: **2.6'**
Bed Material Composition: Cobble/Gravel
Riffle Depths: **2.6'**
Rosgen (BEHI) Bank Stability: See Note 1
Flow Velocity: **2.5 fps**
Notes:

Proposed Design Concepts

Type(s) of LWD:
Number of LWD:
Proposed Habitat/Structure Function (s):

See notes on target area survey field maps.

Other Items/Notes:

1. Generalized erosion mapping provied on annotated field maps, with
Erosion Rated as follows: A: BEHI Low to Moderate B: BEHI Moderate to High,
C: BEHI High to Very High
2. General observations: dynamically eroding along reach

Large Woody Debris Data Summary Form

Date: **10/8/2015**
Enbridge Representative(s): **BP, BD, IJ**
Target Area: **13**
Agency Representative(s): **MD, BG, SJ, JR**
Mile Post Range: **31.75-32.00**

Existing Large Woody Debris Observations

General Number of LWD Observed: **37**
LWD Type (tree, log, stump complex pile)(%): **CP-51% Log-32%, Tree-14%, Stump 3%**
Position Orientation (parallel, perpendicular, diagonal to flow)(%): **Para-49%**
Diagnoal- 27%, Perp.-24%
Habitat/Structure Function: **All provides fish and amphibian/reptile habitat,**
Notes: **most do not have pools, none providing bank protection, none marked as causing bank erosion**

River Characterisitics

Channel Width: 190 ft
Pool Depths: **3'-4'**
Bed Material Composition: Cobble/Gravel
Riffle Depths: **1'-2'**
Rosgen (BEHI) Bank Stability: See Note 1
Flow Velocity: **1.9 fps**
Notes:

Proposed Design Concepts

Type(s) of LWD:
Number of LWD:
Proposed Habitat/Structure Function (s):

See notes on target area survey field maps.

Other Items/Notes:

1. Generalized erosion mapping provied on annotated field maps, with
Erosion Rated as follows: A: BEHI Low to Moderate B: BEHI Moderate to High,
C: BEHI High to Very High
2. General observations: pools relatively shallow, reach overly wide

Large Woody Debris Data Summary Form

Date: **10/9/2015**
Enbridge Representative(s): **BP, BD, IJ**
Target Area: **18**
Agency Representative(s): **MD, BG, SJ, JR**
Mile Post Range: **36.50-37.25**

Existing Large Woody Debris Observations

General Number of LWD Observed: **80**
LWD Type (tree, log, stump complex pile)(%): **CP-40% Log-20%, Tree-36%, Stump 4%**
Position Orientation (parallel, perpendicular, diagonal to flow)(%): **Para-42%**
Diagnoal- 8%, Perp.-51%
Habitat/Structure Function: **All provides fish and amphibian/reptile habitat,**
Notes: **most do not have pools, none providing bank protection, none marked as causing bank erosion**

River Characterisitics

Channel Width: 840 ft (reservoir)
Pool Depths: **N/A**
Bed Material Composition: Sands
Riffle Depths: **N/A**
Rosgen (BEHI) Bank Stability: See Note 1
Flow Velocity: **N/A**
Notes:

Proposed Design Concepts

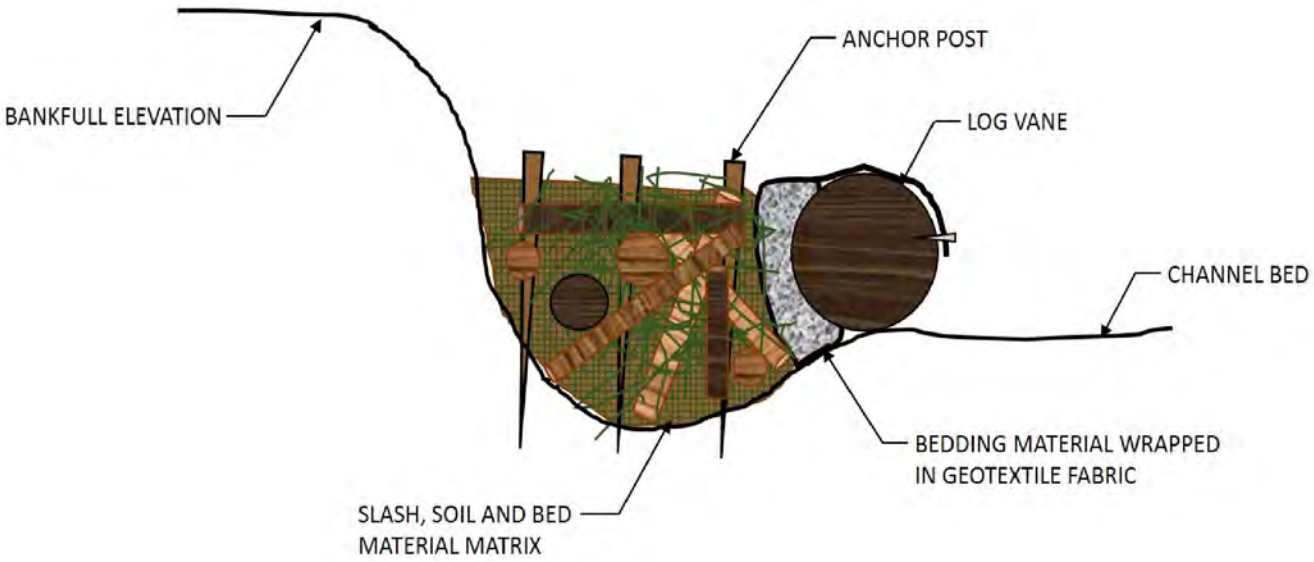
Type(s) of LWD:
Number of LWD:
Proposed Habitat/Structure Function (s):

See notes on target area survey field maps.

Other Items/Notes:

1. Generalized erosion mapping provied on annotated field maps, with Erosion Rated as follows: A: BEHI Low to Moderate B: BEHI Moderate to High, C: BEHI High to Very High

Attachment B
Proposed Large Woody Debris Details



TYPE 1A – WOODEN LOG VANE
SECTION VIEW A-A'

ENBRIDGE	**Legend**	ATTACHMENT B TYPE 1A - WOODEN LOG VANE SECTION VIEW SHEET 1 OF 9
Drawn: BD 2/23/2016		
Approved: BP 2/23/2016		
Project #: 60481718	NOT TO SCALE	ENBRIDGE LINE 6B MP 608 MARSHALL, MI PIPELINE RELEASE ENBRIDGE ENERGY, LIMITED PARTNERSHIP

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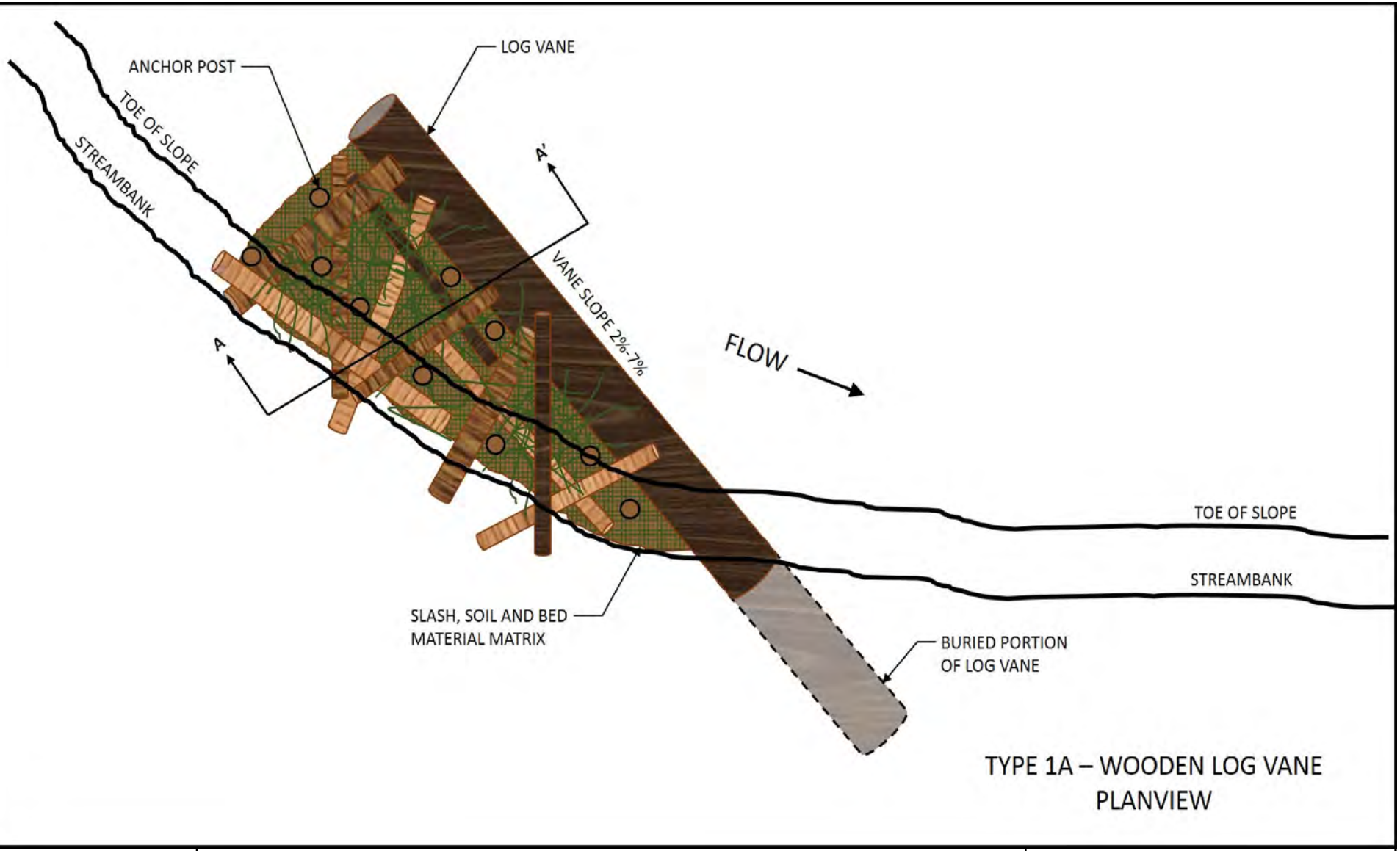

ENBRIDGE	**Legend**	ATTACHMENT B TYPE 1A - WOODEN LOG VANE PLAN VIEW SHEET 2 OF 9
Drawn: BD 2/23/2016		ENBRIDGE LINE 6B MP 608 MARSHALL, MI PIPELINE RELEASE ENBRIDGE ENERGY, LIMITED PARTNERSHIP
Approved: BP 2/23/2016		
Project #: 60481718	NOT TO SCALE	

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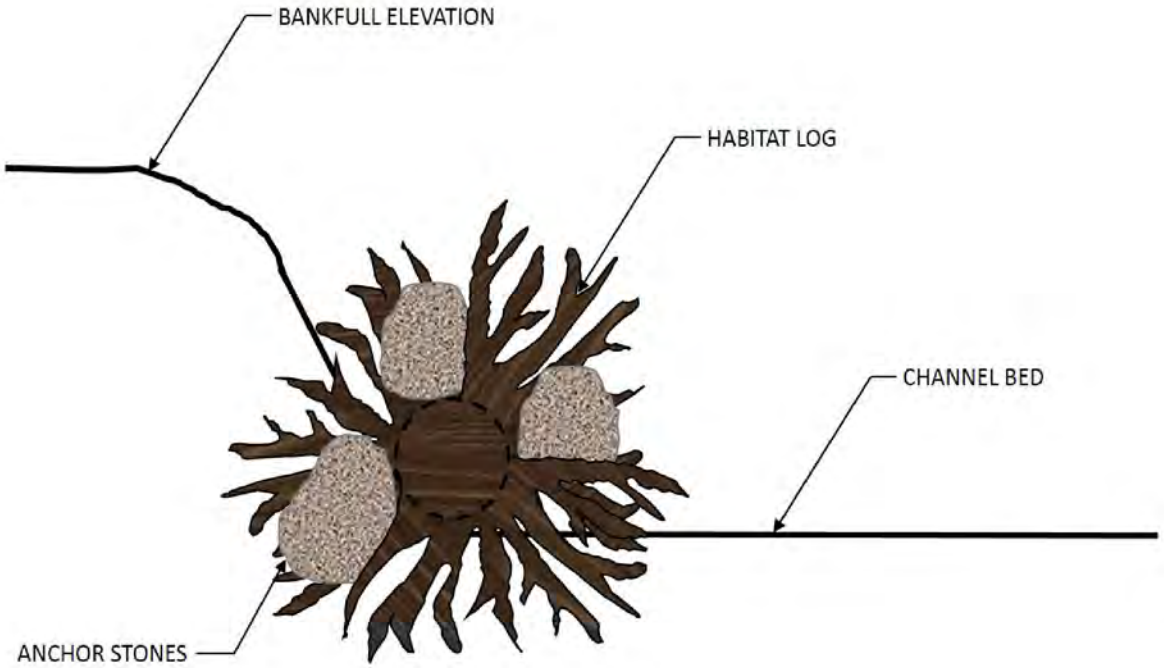


TYPE 1B – HABITAT LOG
SECTION VIEW A-A'

ENBRIDGE

Drawn:	BD	2/23/2016
Approved:	BP	2/23/2016
Project #:	60481718	

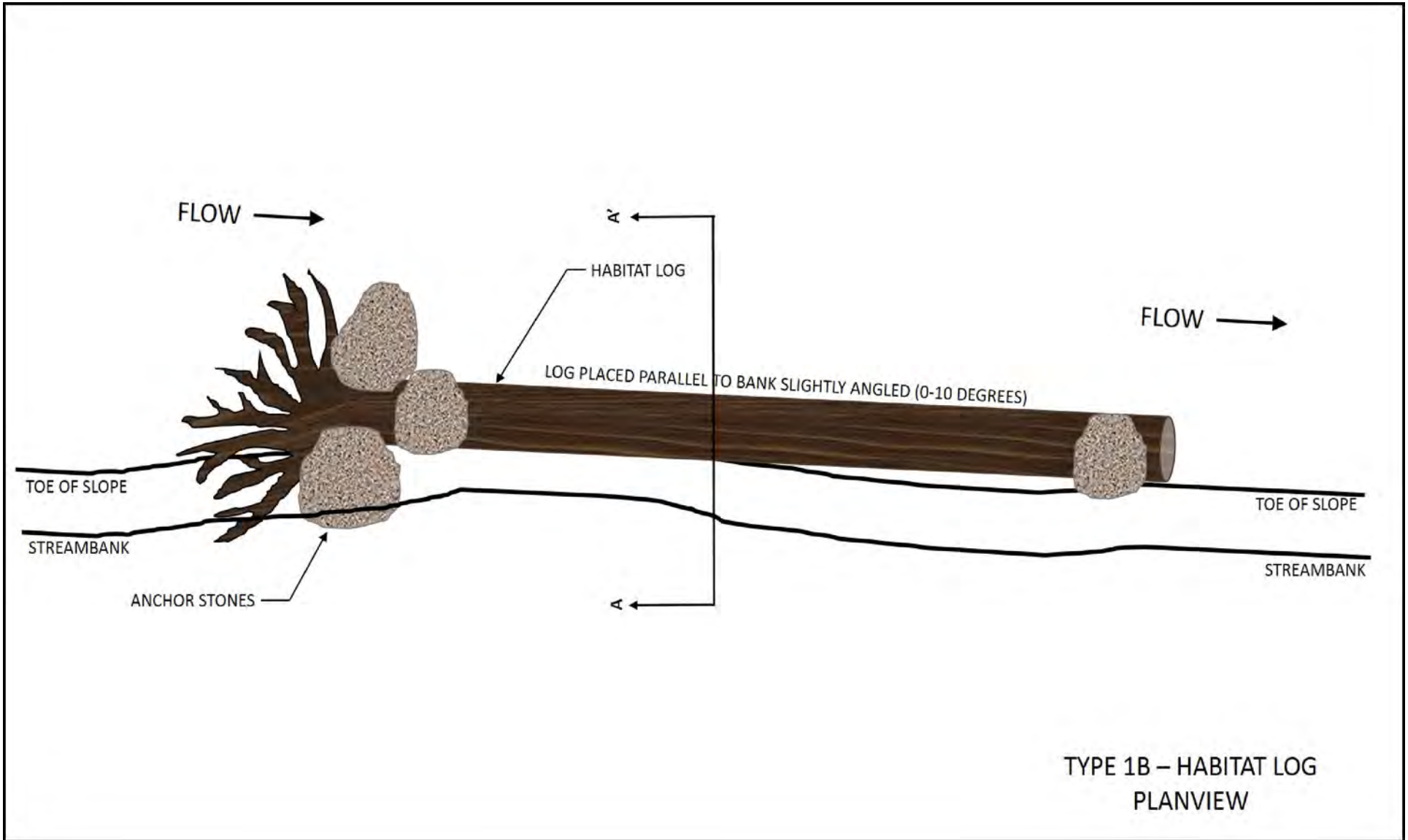
Legend

NOT TO SCALE

ATTACHMENT B
TYPE 1B - HABITAT LOG
SECTION VIEW
SHEET 3 OF 9

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP

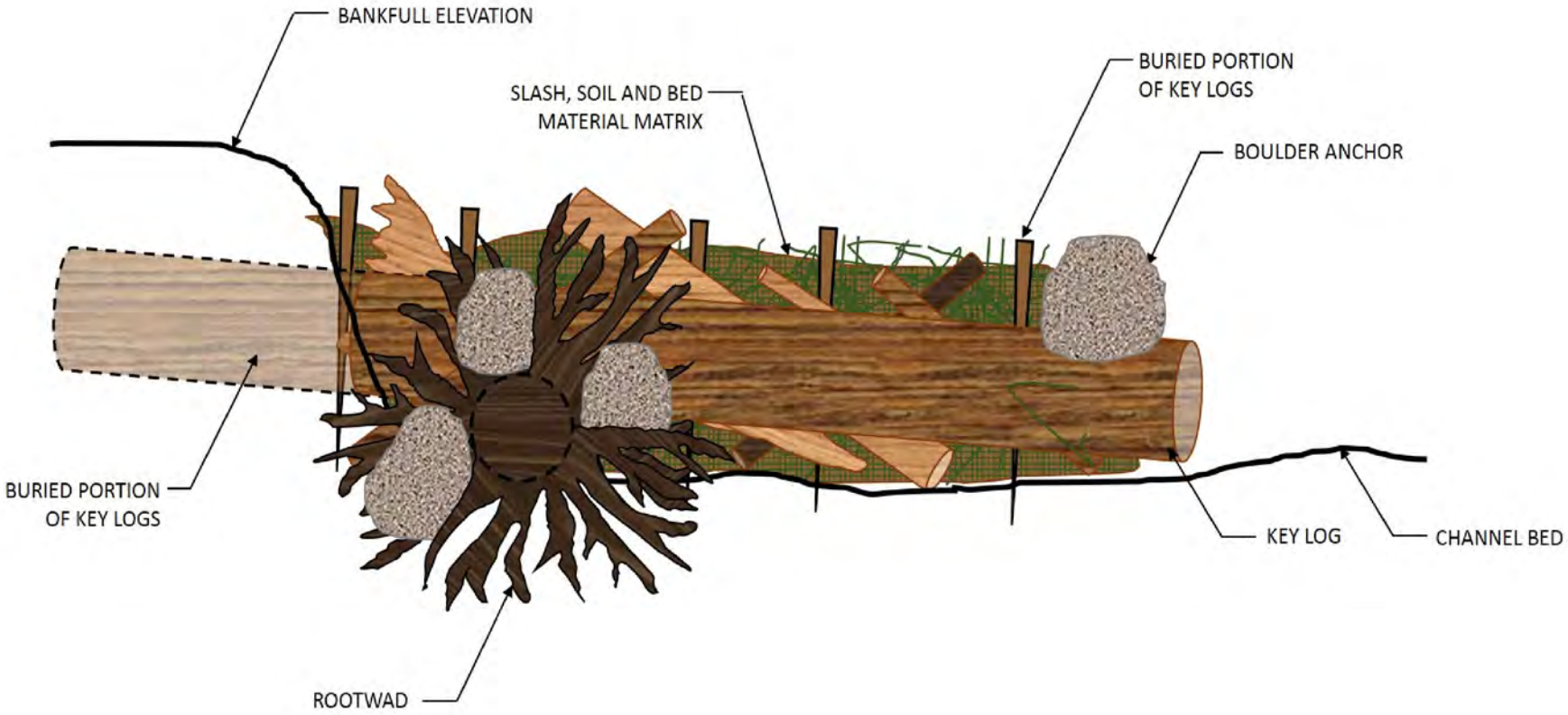
Z:\Work\GIS\2016_Large_Woody_Debris\MXDs\160223_LWD_Type1B_Habitat_Log_Section_View.mxd



TYPE 1B – HABITAT LOG
PLANVIEW

ENBRIDGE	**Legend**	ATTACHMENT B TYPE 1B - HABITAT LOG PLAN VIEW SHEET 4 OF 9
Drawn: BD 2/23/2016		
Approved: BP 2/23/2016		ENBRIDGE LINE 6B MP 608 MARSHALL, MI PIPELINE RELEASE ENBRIDGE ENERGY, LIMITED PARTNERSHIP
Project #: 60481718	NOT TO SCALE	

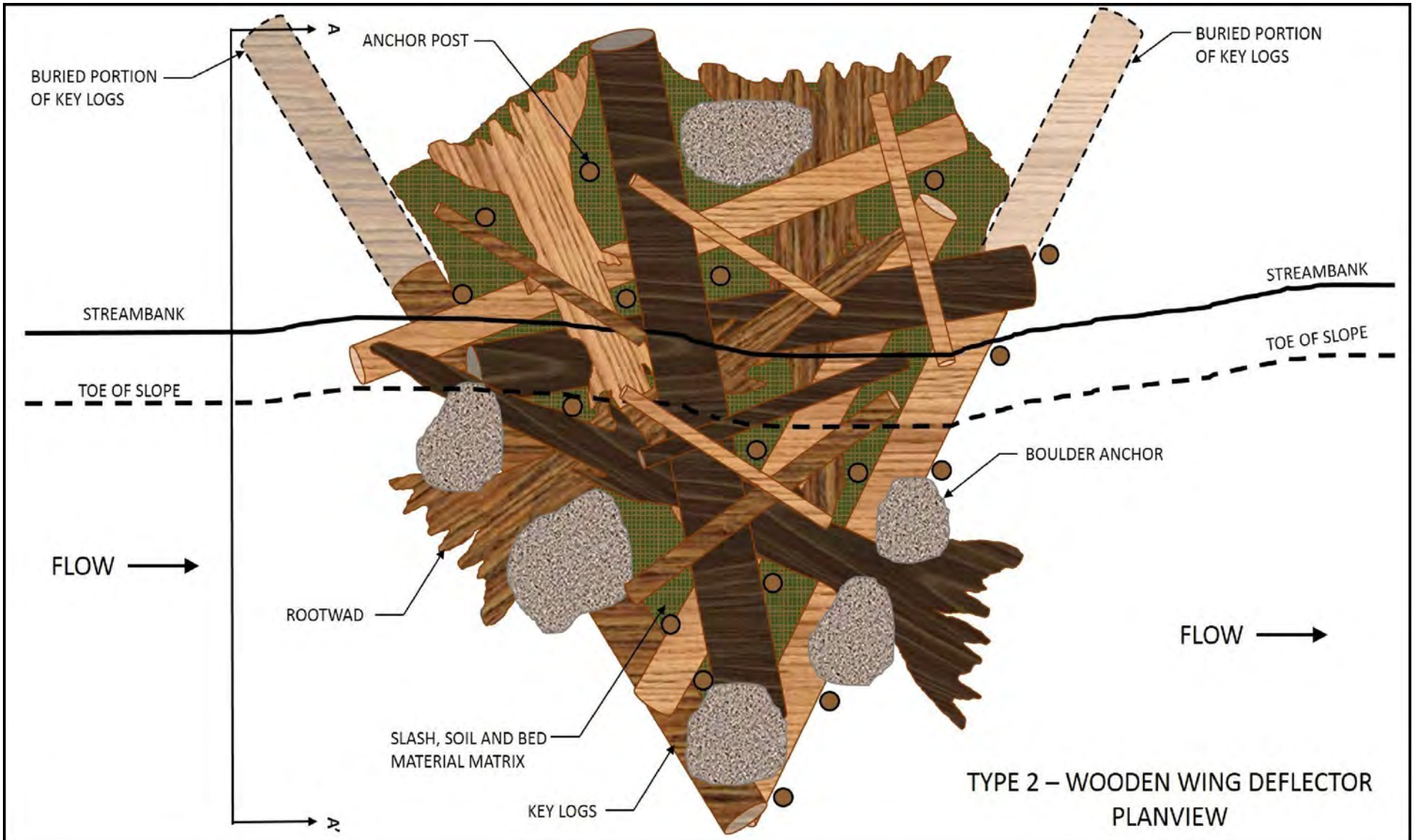
Z:\Work\GIS\2016_Large_Woody_Debris\MXDs\160223_LWD_Type1B_Habitat_Log.mxd



TYPE 2 – WOODEN WING DEFLECTOR
SECTION VIEW A-A'

ENBRIDGE	**Legend**	ATTACHMENT B TYPE 2 - WOODEN WING DEFLECTOR SECTION VIEW SHEET 5 OF 9
Drawn: BD 2/23/2016		
Approved: BP 2/23/2016		
Project #: 60481718	NOT TO SCALE	ENBRIDGE LINE 6B MP 608 MARSHALL, MI PIPELINE RELEASE ENBRIDGE ENERGY, LIMITED PARTNERSHIP

Z:\Work\GIS\2016_Large_Woody_Debris\MXDs\160223_LWD_Type2_Wooden_Wing_Deflector_Section_View.mxd



ENBRIDGE

Drawn:	BD	2/23/2016
Approved:	BP	2/23/2016
Project #:	60481718	

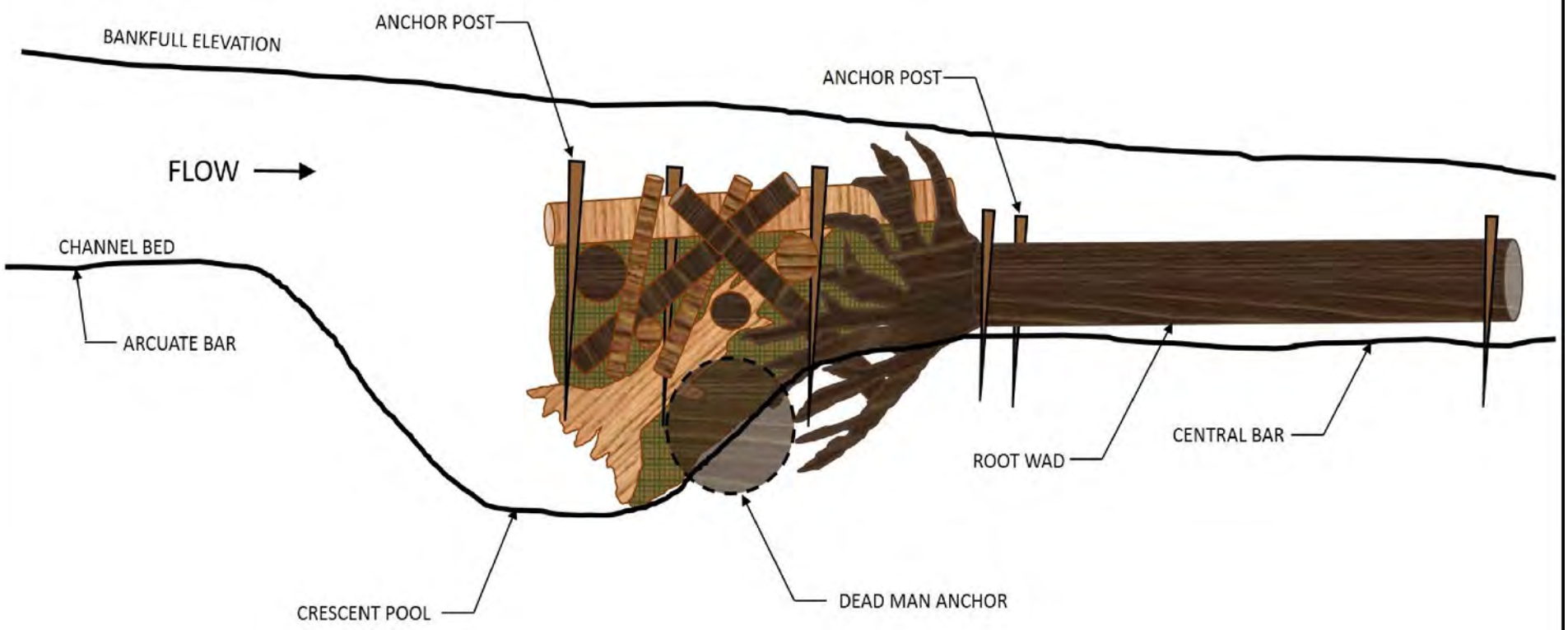
Legend

NOT TO SCALE

ATTACHMENT B
TYPE 2 - WOODEN WING DEFLECTOR
PLAN VIEW
SHEET 6 OF 9

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP

Z:\Work\GIS\2016_Large_Woody_Debris\MXDs\160223_LWD_Type2_Wooden_Wing_Deflector.mxd



TYPE 3 – BAR APEX JAM
SECTION VIEW A-A'

ENBRIDGE

Drawn:	BD	2/23/2016
Approved:	BP	2/23/2016
Project #:	60481718	

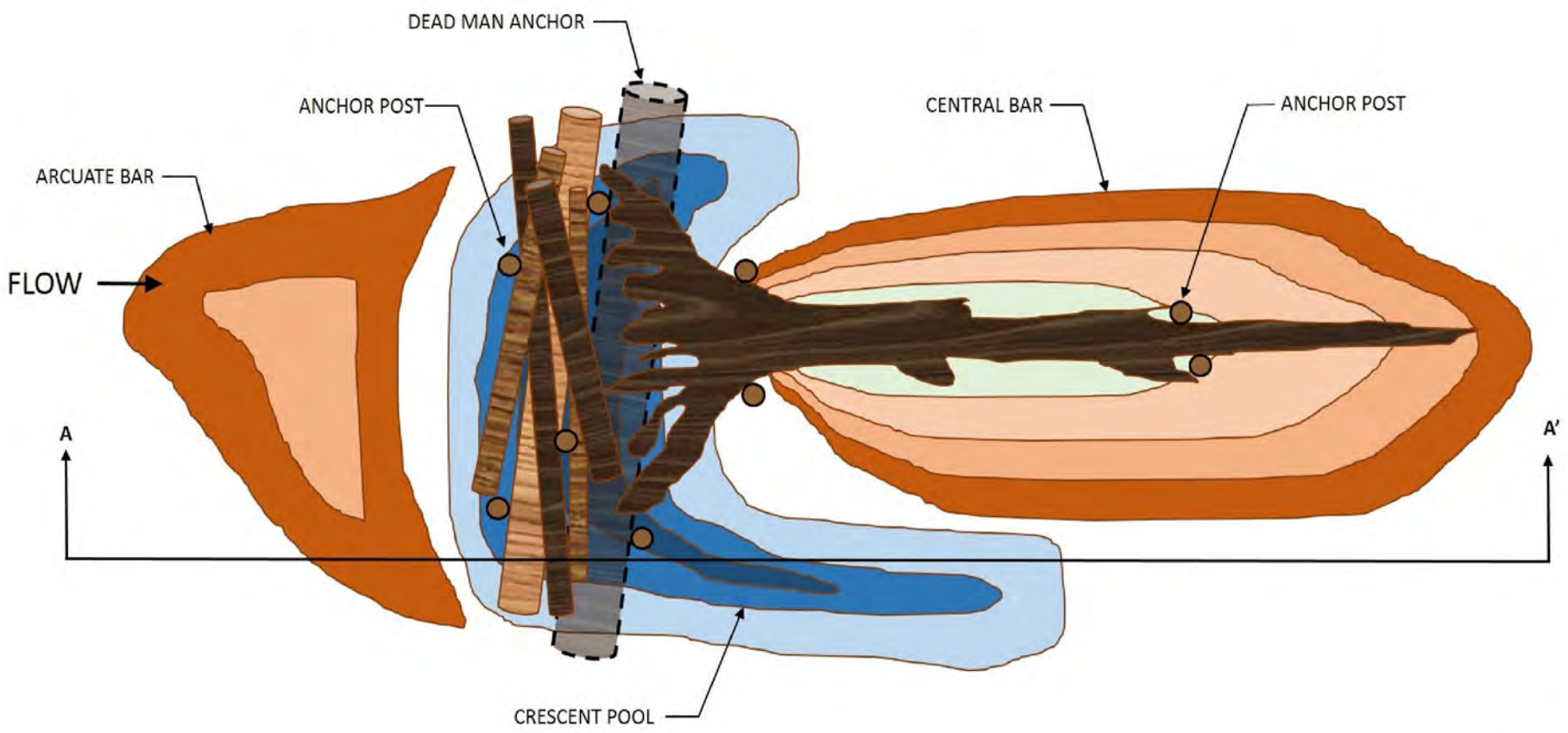
Legend

NOT TO SCALE

ATTACHMENT B
TYPE 3 - BAR APEX JAM
SECTION VIEW
SHEET 7 OF 9

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP

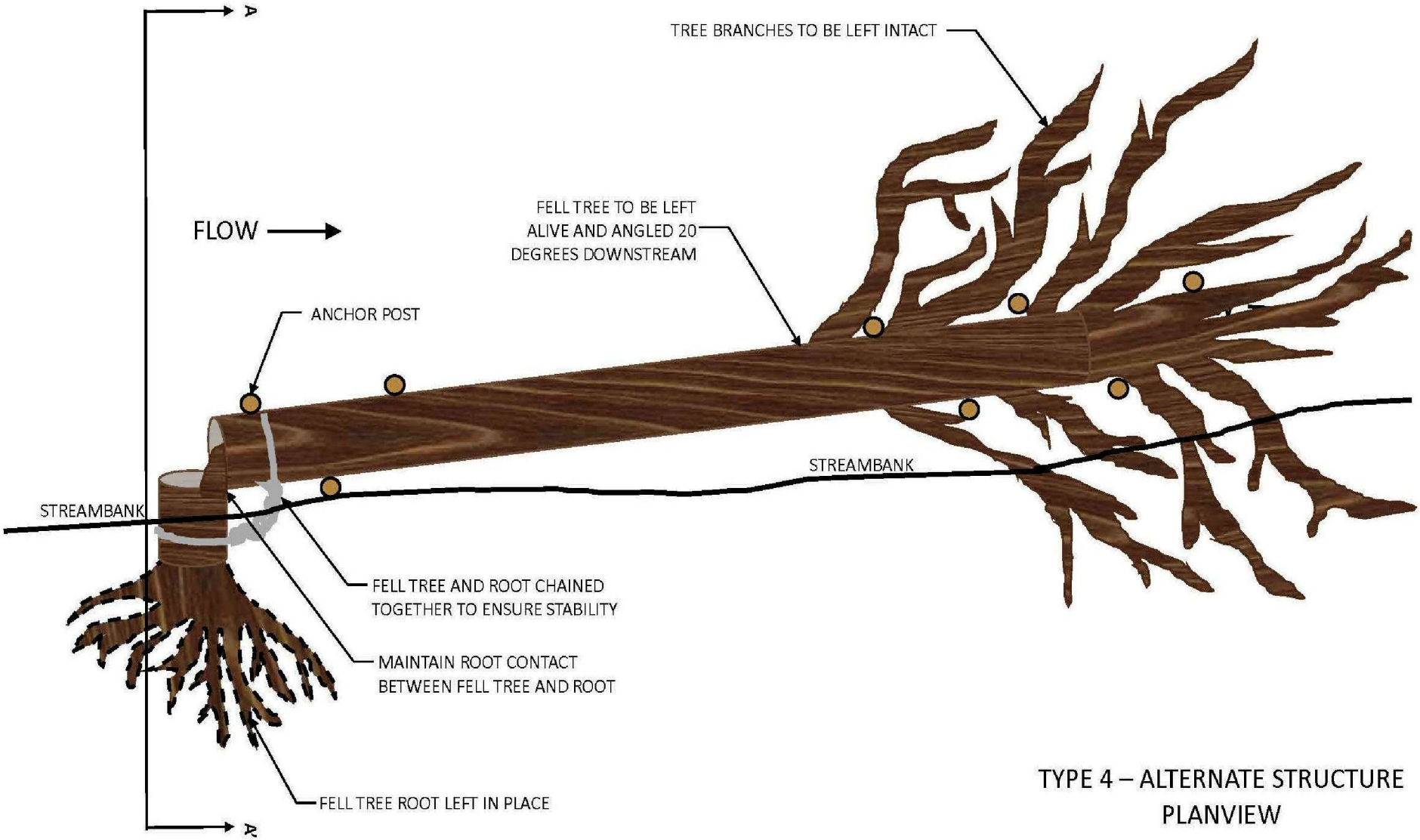
Z:\Work\GIS\2016_Large_Woody_Debris\MXDs\160223_LWD_Type3_Bar_Apex_Jam_Section_View.mxd



TYPE 3 – BAR APEX JAM
PLANVIEW

ENBRIDGE	**Legend**	ATTACHMENT B TYPE 3 - BAR APEX JAM PLAN VIEW SHEET 8 OF 9
Drawn: BD 2/23/2016		
Approved: BP 2/23/2016		ENBRIDGE LINE 6B MP 608 MARSHALL, MI PIPELINE RELEASE ENBRIDGE ENERGY, LIMITED PARTNERSHIP
Project #: 60481718	NOT TO SCALE	

Z:\Work\GIS\2016_Large_Woody_Debris\MXDs\160223_LWD_Type3_Bar_Apex_Jam.mxd



ENBRIDGE

Drawn:	BD	2/23/2016
Approved:	BP	2/23/2016
Project #:	60481718	

Legend

NOT TO SCALE

ATTACHMENT B
TYPE 4 - ALTERNATE STRUCTURE
PLAN VIEW
SHEET 9 OF 9

ENBRIDGE LINE 6B MP 608
MARSHALL, MI PIPELINE RELEASE
ENBRIDGE ENERGY,
LIMITED PARTNERSHIP

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Attachment C
Large Woody Debris Exhibits

Large Woody Debris Exhibits

Exhibit 1. Natural example of LWD similar to Type 1A Structure

Exhibit 2. Natural example of LWD similar to Type 1B Structure

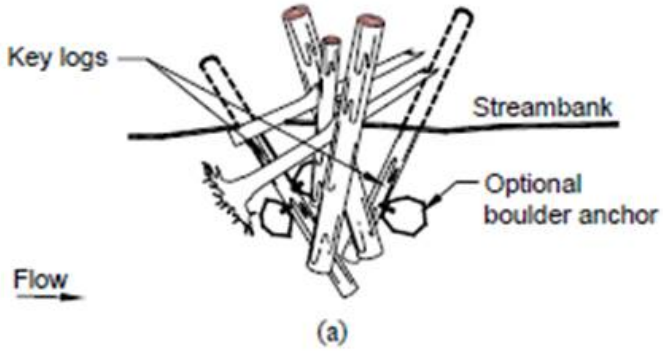
Large Woody Debris Exhibits

Exhibit 3. Example of Type 2 Wing Deflector Structure

Exhibit 4. Example of Type 2 Wing Deflector Structure

Large Woody Debris Exhibits

Exhibit 5. Example of Type 2 Wing Deflector Structure



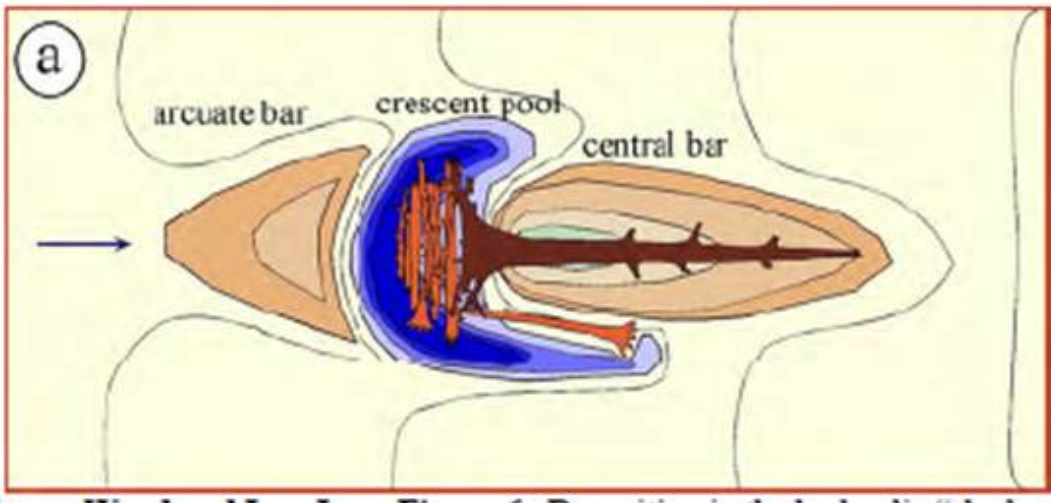
(a)

(b)

Exhibit 6. Natural Example of Type 2 Wing Deflector Structure

Large Woody Debris Exhibits

Exhibit 7. Schematic of LWD similar to Type 3 Structure (from WDF, 2012)



Large Wood and Log Jams Figure 6. Deposition in the hydraulic "shadow of an instream tree, burying the bole of the tree. (courtesy Tim Abbe)

Exhibit 8. Natural Example of Type 3 LWD Structure

Large Woody Debris Exhibits

Exhibit 9. Example of living, horizontal riverbank tree (Type 4 Alternate LWD Structure)

Exhibit 10. Example of living, horizontal riverbank tree (Type 4 Alternate LWD Structure)

Large Woody Debris Exhibits

Exhibit 11. Example of living, horizontal riverbank tree (Type 4 Alternate LWD Structure)

Exhibit 12. Example of living, horizontal riverbank tree (Type 4 Alternate LWD Structure)

Large Woody Debris Exhibits

Exhibit 13. Example of living, horizontal riverbank tree (Type 4 Alternate LWD Structure)